AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A management method of network devices, comprising the following steps of:

(A) composing, by a plurality of network devices, a cluster through following steps:

(1) designating a device in a network as a cluster management device and configuring the device correspondingly by a network management device;

(2) initiating a topology acquisition process to acquire information of topological architecture of the network within a specified number of hops in the network by the cluster management device;

(3) designating candidate devices to be added to the cluster in the topological architecture according to the information of topological architecture acquired from the cluster management device, and informing the cluster management device to start the cluster member device addition process by the network management device;

(4) adding the designated candidate devices to the cluster and configures the candidate devices correspondingly by the cluster management device, so as to make the candidate devices become member devices of the cluster;

(5) after the cluster is established, managing the member devices in the cluster by the cluster management device, and forwarding management messages which are from outside of the cluster and destined to the member devices through standard Network Address Translation (NAT) process to corresponding member devices to process, and processing the management messages according to normal processing process by the member devices;

wherein, the process of adding candidate network devices to the cluster in step (4) comprises:

(A1) sending cluster addition requests to candidate network devices that can be added to the cluster by the cluster management device;

(A2) determining whether it can be added to the cluster or not according to its own condition by each candidate device; if the candidate device can not be added to the cluster, feeding back a reject response and terminating the cluster addition process; otherwise feeding back an accept response to the cluster management device;

(A3) after receiving the response from the candidate device and if the candidate device agrees to be added to the cluster, sending a configuration message containing private IP address, member number, handshaking interval, state retention time, etc. to said candidate device by the cluster management device; after receiving the message, configuring the candidate device correspondingly, and sending a complete response to the cluster management device after the configuration;

~~(A)~~ (B) establishing IP data channels via [[a]] the cluster management device between the network devices in [[a]] the cluster and [[a]] the network management device by the cluster management device,

the cluster management device configuring the network devices with a data structure comprising following fields:

network type: designed to identify the type of network where the device is; and

physical address: designed to identify the physical address of the device in the network,

wherein at least one of the network devices in the cluster is designated as the cluster management device and configured with a public IP address; the network devices in the cluster are configured and updated with private IP addresses and routes by the cluster management device; and

~~(B)~~ (C) managing the network devices in the cluster through said IP data channels via the cluster management device by said network management device.

2. (Original) The method according to claim 1, wherein said cluster management device configures and updates other network devices with private IP addresses and routes

according to information of topological architecture of the network and device information of the network devices in the cluster.

3. (Original) The method according to claim 2, wherein said cluster management device configures the other network devices with private IP addresses dynamically.

4. (Previously Presented) The method according to claim 1, wherein said cluster comprises a plurality of said cluster management devices, and one of the cluster management devices is responsible for managing the configuration and update of private IP addresses and routes of the network devices in the cluster as well as the communication between said network management device and the network devices in the cluster; in case said cluster management device fails, one of the other cluster management devices is designated to be responsible for managing the configuration and update of private IP addresses and routes of the network devices in the cluster as well as the communication between said network management device and the network devices in the cluster, according to a predetermined policy.

5. (Cancelled)

6. (Currently Amended) The method according to claim 4, wherein in step ~~(A)~~ (B), said cluster management device establishes IP data channels via said cluster management device between the network devices in the cluster and said network management device with network address translation technology.

7. (Cancelled)

8. (Currently Amended) The method according to claim [[7]] 1, wherein said configuring the cluster management device correspondingly as described in step (1) includes configuring the following items on the device: cluster name, enable state of cluster, management IP address pool of cluster, state retention time of cluster,

handshaking time interval of member devices, role of the cluster management device in the cluster, and IP address of the cluster management device.

9. (Cancelled)

10. (Currently Amended) The method according to claim [[9]] 1, wherein in step (A2), determining whether the candidate device itself can be added to the cluster is implemented through determining whether the candidate device has already been in another cluster and whether software version in the candidate device supports cluster management.

11. (Currently Amended) The method according to claim [[9]] 1, wherein in step (A2), before feeding back the accept response to be added to the cluster to the cluster management device, the candidate device will determine whether a super user password is set on itself; if a super user password has not been set, the candidate device feeds back the accept response message to be added to the cluster directly; if a super user password has been set, the candidate device feeds back an authentication request to the cluster management device; then, the candidate device authenticates itself according to the authentication information sent from the management device; if the authentication is successful, the candidate device feeds back the accept response to be added to the cluster; otherwise feeds back a reject response to be added to the cluster to the cluster management device.

12. (Currently Amended) The method according to claim [[7]] 1, wherein the necessary configuration for each member device added to the cluster in step (4) includes configuring each member device with the following items: member device number, private IP address of member device, name of member device, state of member device, operating state of member device, and cluster management password.

13. (Cancelled)

14. (Currently Amended) A cluster management apparatus for network devices comprising: a cluster device manager and a member device connected with the cluster device manager, wherein:

the cluster device manager comprises:

an address translation module, adapted to perform network address translation for management messages of member devices;

a Dynamic Host Configuration Protocol (DHCP)-like module, adapted to accomplish allocation of private IP addresses to member network devices;

a first cluster member management module, which is connected with the address translation module A11, the DHCP-like module A12 and a topological information processing module A14 individually, and adapted to manage member network devices in a concentrate manner, and to forward management messages, which are from outside of the cluster and destined to member devices, to respective member devices to process, so that the member devices can process the management messages according to normal processing process;

a first topological information processing module, adapted to detect the topological architecture of network and to acquire the information of topological architecture of network within a specified number of hops in the network;

the member device comprises:

a second cluster member management module, adapted to accomplish cluster management at the member device end;

a second topological information processing module, adapted to accomplish detection of adjacent devices and response/forwarding of topology acquisition requests,

the cluster device manager configuring the member devices with a data structure comprising the following fields:

network type: designed to identify the type of network where the member device is; and

physical address: designed to identify the physical address of the member device in the network;

wherein, the topological information processing module acquires information of topological architecture of network within a specified number of hops in the network

through the topological information processing module at a candidate device side, and sends the information to the cluster member management module; the cluster member management module sends a cluster addition request to the cluster member management module in a candidate device that can be added to the cluster; the cluster member management module determines whether to be added to the cluster according to its conditions, and feeds back an accept or a reject response to the cluster member management module; when the cluster member management module receives an accept message from the candidate device, the DHCP-like module performs allocation of a private IP address of member network device and sends the private IP address, together with configuration information including member number, handshaking interval, and state retention time etc, to the cluster member management module in the candidate device via the cluster member management module; the cluster member management module uses the information to configure the candidate device accordingly, and feeds back a complete response to the cluster management device after configuration operation.

15. (New) The method according to claim 1, wherein the step (2) is performed to acquire information of managed devices to be added into the management cluster, the information including MAC address and interconnection port number of each managed device.

16. (New) The cluster management apparatus according to claim 14, wherein the translation module processes in standard network address translation the management messages, which are from outside of the cluster and destined to the member device after the candidate device becomes a member device of the cluster and the management messages is forwarded to the cluster member management module of the respective member device via the cluster member management module.